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ABSTRACT

These case studies highlight the diversity of four tech programs that responded with a unique set of organizational policies and procedures to a unique set of challenges. The case study on City Tech Tech-Prep Consortium in Brooklyn focuses on three strategies: transition to City Tech program, postsecondary component, and program evaluation. The second case study is on Greater Capital District Tech-Prep Consortium, which involved 34 school districts, 4 regional Boards of Cooperative Educational Services (BOCES), 6 2-year postsecondary institutions, and over 150 business partners. It describes three organizational features created to serve all participants effectively: organizational structure for management of a very large consortium, development of a mini-grant process for members, and formation of partnerships. The third case study targets the Mid-Suffolk Tech-Prep Consortium, one of two tech prep programs in Suffolk County, an area of 911 square miles with about 1.5 million residents. It focuses on three areas that allowed the program to position itself to further transform the region by serving as a conduit between educational and business communities: BOCES as a tech prep fiscal agent, collaboration with the Long Island Association, and curriculum development in high tech areas. The fourth case study discusses the Tech-Prep Consortium of Queens, which created articulated 4-year seamless curricula in three career cluster. It describes three features: transition to college sequence of activities and services, staff development, and instructional materials development. Contact information is appended. (YLB)

TECH-PREP IN NEW YORK STATE:

PROFILES OF FOUR DIVERSE PROGRAMS

Michael W. Frenkel
Communication Associate, Tech-Prep Technical Assistance Center
Center for Advanced Study in Education
City University of New York Graduate School

Stanley M. Brodsky, Ph.D., P.E.
Director, Tech-Prep Technical Assistance Center
Center for Advanced Study in Education
City University of New York Graduate School

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Mike Frenkel
Stan Brodsky

TECH-PREP IN NEW YORK STATE: PROFILES OF FOUR DIVERSE PROGRAMS

INTRODUCTION

The Carl D. Perkins Vocational & Applied Technology Education Act of 1990 (VATEA) introduced Tech-Prep (Title IIIE) as a new program component. Tech-Prep envisioned a consortia of schools and colleges that would jointly develop applied curricula to create a smooth transition from high school (grades 11 and 12) through an associate degree program in career-oriented fields of study. This required a rethinking of pedagogical techniques and formats, with a focus on contextualized instruction in applied curricula to include real world problem-solving and employment skills preparations as the basis for rigorous instruction.

One of the most important innovations of Tech-Prep was the requirement that college and secondary school faculty collaborate on applied and articulated curricula and student processes. Traditionally, collaboration among faculty across institutional levels had been rare because of their professional differences. Secondary school and college faculty belong to different professional organizations, attend different meetings and professional development programs and essentially work in different worlds while dealing with many of the same student groups. Tech-Prep, however, fundamentally changed that situation to the benefit of both college and high school personnel, and ultimately students.

With the enactment of the Carl D. Perkins Vocational and Technical Education Act of 1998, Tech-Prep was designated as a separate program and was strengthened by the addition of several new features: a multi-year authorization, which encourages consortia to expand their scope to include grades 9 and 10; the increased use of educational technology and distance learning; the expansion of linkages between institutions of higher education and the business community and the provision of incentives to provide education and training in areas of significant workplace shortages (for example, information technology).

Tech-Prep consortia have been funded in New York State since the 1991-92 fiscal year

with a total of 30 programs being initiated over a four year period and continuing to the present time. The consortia vary significantly in terms of size, scope and thrust. Some include only a single high school and college, while others comprise several counties with more than 25 school districts, several colleges and one or more BOCES[1] In addition, some consortia concentrate on one career field, such as medical lab technology or nursing, while others offer programs in a broad spectrum of fields and sub-fields including business-related, engineering-related, allied health and trade and industry programs.

To demonstrate the range of program goals, operational procedures and outcomes within the Tech-Prep initiative in New York State, four case studies were conducted during the fall and spring of 1998-99 and are reported on here. The purpose of this project is to demonstrate that Tech-Prep in New York State is not monolithic or overly standardized and that success is fostered within a framework of program diversity.

The four programs chosen for this study share several key features. All programs were initially funded in year one (1991-92) or two (1992-93) by the New York State Education Department and continue to retain their original project directors. These four programs have successfully met the overall objectives of the Tech-Prep mission, though each faced a unique set of challenges and responded in kind with a unique set of organizational policies and procedures. The four programs were also chosen because they demonstrate this range of diversity. Program profiles focus only on these unique characteristics and are in no way intended to convey the scope or totality of each project. Data included in this study were taken from interim and final reports provided to the New York State Education Department by the four consortia. The following consortia are described:

City Tech Tech-Prep Consortium (CTTPC), Brooklyn
Greater Capital District Tech-Prep Consortium (GCDTPC), Albany
Mid-Suffolk Tech-Prep Consortium (MSTPC), Bellport
Tech-Prep Consortium of Queens (TPCQ), Bayside

[1] BOCES refers to the Board of Cooperative Services which are separate institutions that provide vocational and technical education courses and other special services to regional high school students.

Each consortium participating in this study welcomes inquiries about its activities and has designated a knowledgeable contact person to respond to requests for information. [See the Appendix for a list of program representatives.]

CITY TECH TECH-PREP CONSORTIUM

Introduction

New York City Technical College (City Tech), the technical college of the City University of New York (CUNY), offers associate and bachelor degree programs in the engineering technologies, business/information systems and the health sciences. City Tech is located in downtown Brooklyn, a vast, multi-ethnic borough of New York City with a population of more than two million residents. The college, through its Office of High School Programs, has served as the fiscal agent for the City Tech Tech-Prep Consortium (CTTPC) since 1991.

Consortium partners include the New York City Board of Education, the Center for Advanced Study in Education at the CUNY Graduate School and the following nine New York City public high schools: Benjamin Banneker Academy, Brooklyn Technical, Clara Barton, George Westinghouse Vocational & Technical, Seward Park, Telecommunications, Tilden, Transit Tech and William E. Grady Vocational & Technical. The consortium also includes members of the business community such as SIAC, KeySpan, local area hospitals and health treatment centers and the Brooklyn School-to-Work Partnership. In addition, the CTTPC has benefited greatly from its affiliation with the National Center for Research in Vocational Education (NCRVE) at the University of California, Berkeley and the local NCRVE satellite site, the Institute on Education and the Economy at Teachers College, Columbia University.

The CTTPC has designed and implemented Tech-Prep models at each participating high school that are tailored to the needs and interests of students and staff members at each site. Each model, however, features the following common Tech-Prep features: applied learning strategies, the integration of academic core disciplines with vocational/technical career majors and high school curricula which feed seamlessly to comparable associate and bachelor degree programs offered at City Tech. In February 1999, the CTTPC reported a total enrollment 940 high school participants and an enrollment of 205 postsecondary students at City Tech.

This report focuses on three primary strategies stressed by the CTTPC: the transition to

City Tech program, the postsecondary component and program evaluation.

Transition to City Tech

The main goal of the CTTPC initiative has been to follow the basic 2 + 2 Tech-Prep blueprint which prepares students at the high school level to successfully matriculate at and complete degree programs offered at City Tech. However, this process has posed several challenges: identifying candidates in the 10th grade, creating a structured program of integrated technical and academic courses, acclimating students to the City Tech campus and helping them make the successful transition from high school to college.

Formal Recruitment Process

CTTPC has developed a formal recruitment process that is conducted at high school sites by designated Tech-Prep guidance counselors. It includes counselor presentations, the screening of a consortium produced program video and a student survey which explores college and career plans. Finally, a packet is distributed for review at home which includes an overview of Tech-Prep, a description of the school's structured Tech-Prep program and a non-binding student/parent contract. Student selection is based on the following: the return of the signed contract, completion of the student survey, a review of the student transcript and counselor recommendation.

Tech-Prep students are block scheduled in grades 11 and 12 for courses utilizing applied and integrated curricula and participate in a variety (depending on school site) of career awareness, work-based and projects-based learning experiences. In addition, a menu of college awareness and preparation activities are offered which include:

- tours of the college campus and career major departments;
- a shadowing program in which high school seniors spend a full day on campus with a college student mentor,
- preparation for CUNY entrance exams (reading ,writing, math) which includes pre-testing and review workshops for students who fail one or more exams;
- CUNY application and financial aid workshops;
- advanced standing workshops in preparation for qualifying exams; and
- pre-registration for the student's first semester at City Tech.

In spring 1994, the consortium introduced a pre-freshman course that had multiple objectives. It was designed to serve as a laboratory setting for teachers to explore ways to more effectively integrate academic and technical disciplines and to better prepare students to meet college level basic skills standards. In addition, the course attempted to address adjustment problems often experienced by enrollees at a large, anonymous, urban, commuter campus by offering a sustained on-campus experience.

The Great Thinkers in Science Pre-Freshman Course

The "Great Thinkers in Science" pre-freshman course has been offered each spring semester on the City Tech campus to Tech-Prep high school seniors who plan to attend City Tech the following semester. Students receive high school English credit for this course which is team-taught by high school and City Tech instructors on Saturdays for three to four hour time blocks. It utilizes a variety of learning methodologies and assessment strategies and is revised annually.

This theme-based course focuses on the work of key figures in science such as DaVinci, Galileo, Darwin and Freud. Each unit, which is introduced by a guest lecturer, includes discussions, reading and writing activities, "hands-on" applications and field trips which relate directly to each thinker. The Galileo unit, for example, includes replication of three of Galileo's original experiments (the inclined plane, the pendulum and Archimedes' proof) in a physics lab as well as reading and writing activities based on the Brecht play, *Galileo*.

The second half of the course asks students to apply the observational thinking perspectives of great thinkers to group projects. Students then present their work to a panel of educators as the capstone for the course. In 1994, group projects varied from the design of an electronic sensing device, to a computer game which teaches math concepts to children and to a survey of student attitudes on teenage pregnancy. In 1999, each team worked on the same project assignment and built a DaVinci flying machine, described the design and construction process for a Web page and presented the model to a panel.

The course specifically targets the CUNY entrance exam in writing, and students are pre-tested and post-tested with this exam. In addition, the course provides a sustained introduction to faculty and staff members, the college library and labs and the methods and rigors of college-level courses.

Elements of the "Great Thinkers" course -- such as the theme-based approach, use of computer writing labs and group projects and presentations -- have been adapted for use in various Tech-Prep high school English classes. In addition, plans are underway to develop this course as an interactive, multimedia on-line course.

Tech-Prep at City Tech: The Postsecondary Component

As is common with many Tech-Prep initiatives, the CTTPC initially focused time and resources at the secondary school level and did not begin efforts to integrate Tech-Prep strategies at City Tech until significant numbers of students began to matriculate to the postsecondary site. In addition, according to CTTPC director Anne Gawkins, implementation of a postsecondary component presented several significant obstacles. One, for college level instructors, professional development usually focuses on course content issues while high school colleagues tend to focus more on pedagogical strategies. Two, since the CTTPC articulated with well over a dozen technical departments, no one department included a significant cohort of Tech-Prep students. Consequently, project administrators were reluctant to suggest major reform strategies to departments that were impacted with so few students.

The consortium, instead, initiated the postsecondary component by developing a series of intensive, supplemental student services. These activities included: tutoring and counseling, creation of a Tech-Prep college club, career skills workshops, an electronic mentoring program with industry mentors and a peer-group registration process for common classes. These activities offered meaningful cognitive and affective support, yet they did not approach the level of systemic change undertaken at the secondary school level. In 1998, however, the CTTPC did introduce two major strategies at the postsecondary level. These are the Tech-Prep Linked Core Courses Program and College-Based Enterprises.

Linked Core Courses

In September 1998, the CTTPC introduced a focused staff development program that would lead to meaningful curriculum reform at the postsecondary level for Tech-Prep students. The "Tech-Prep Linked Core Courses" program is an outgrowth of the "Great Thinkers in Science" course described above. Four teams, of two faculty members each at City Tech, were selected, based on an open "request for proposal" process, and were given release time to collaborate on the development of linked freshman level required courses. The four pairs included: elements of sociology and statistics, introduction to paralegal studies and mathematics, English 101 and the history of science and English 101 and mathematics.

Each curriculum utilizes Tech-Prep applied learning methodologies. While each subject area retains its own curricular identity and meets basic course requirements, courses are modified so that students gain an interdisciplinary perspective as well. For example, the math/legal studies pair includes a research paper focused on the ethical and legal issue of insider trading. In addition, students are given a paper credit of $100,000 to invest in the stock market. The math/English curriculum involves writing assignments such as a math student autobiography, research on the history of indirect measurement, the significance and impact of the Pythagorean Theorem and research on treatments for math anxiety.

Faculty team members presented their curriculum designs to City Tech colleagues at a professional development seminar in February 1999. These courses will be piloted in September 1999 as block scheduled courses for Tech-Prep freshmen.

College-Based Enterprises

Most of the CTTPC's postsecondary students enrolled in health sciences departments participate in on-site internships as part of the course requirements; however, high-tech internships are extremely rare. Project staff, recognizing the importance of applying learning to "real world" contexts, explored ways to offer high tech opportunities to Tech-Prep students enrolled in the college's engineering and business technologies. Project administrators applied for and received funding from the Fund for the Improvement of Postsecondary Education

(FIPSE) in 1998 to adapt the school-based enterprise concept, now widely used at the secondary level, to create two "college-based" enterprises at City Tech for Tech-Prep students enrolled in engineering and business/information technology programs. This concept, first developed at CTTPC high school sites, has led to the creation of a controlled, cost-efficient and sustainable work-based learning model that ultimately will employ 50 postsecondary Tech-Prep students.

In the first enterprise, students from five technology departments, under faculty supervision, operate the college's "Community Computer Support Service Center." They assume responsibility for all aspects of the business including planning, management, advertising and marketing, consumer and corporate outreach and sales as well as more technical tasks such as troubleshooting and repairing hardware, networking and Web page design.

The second enterprise, which is housed in the college's state-of-the-art "Manufacturing Resource Center," serves as a technical assistance resource for the area's public and private sector. Brooklyn contains more than 2,000 small manufacturing businesses that are unable to keep pace with rapidly changing technologies. The Center helps these firms to develop modernization plans, design product prototypes and remanufacture existing equipment and machinery. Students perform all of the Center's functions in an entrepreneurial context.

Program Evaluation

From the outset, the CTTPC recognized the importance of program evaluation in assessing program effectiveness and informing program designers of areas in need of refinement. During the program's first year, an independent evaluator was hired to design a formal evaluation and establish a student database.

The program evaluator trained college and high school counselors to administer instruments that would examine student understanding of and interest in technical careers as well as academic and career self-esteem issues. Counselors were also asked to collect biographical and school performance information on students. Comparable data were collected for control groups. Mailings and phone interviews were used to track students as they progressed from high

school, to college to careers. In addition, the evaluation included a component to document the consortium's growth in areas such as curriculum and staff development, student recruitment strategies and articulation agreements.

A National Study of Tech-Prep and School-to-Work

The CTTPC was one of six sites chosen to participate in a long term national study by NCRVE entitled, *The Community College and Beyond: How Tech Prep/School-To-Work Affects Students*. CTTPC's longstanding relationship with NCRVE, as well as its comprehensive evaluation plan, was instrumental in the selection process. The study will determine student outcomes associated with participation in Tech-Prep and School-to-Work programs. More specifically, the primary authors and co-directors of this project, Debra Bragg and Carolyn Dornsife, describe three primary study goals:

- To describe the key characteristics of Tech-Prep/STWOA systems and student participants, including students' personal characteristics, educational and employment experiences, aspirations, and outcomes;
- To compare the educational and economic outcomes of participants in Tech-Prep/STWOA systems to non-participants; and
- To provide an in-depth understanding of the various dimensions of student experiences as they transition to the postsecondary education level and work, such as students' perceptions, preferences, successes and failures.

This study responds to the federal government's growing interest in connecting funding to accountability. Quite simply, Congress wants to fund successful programs and jettison duplicative or unproductive programs. A final report of this two-year study is expected to be released in late fall of 1999.

Tech-Prep Data "Flagging" System

The New York State Education Department, in response to this demand for accountability, determined that a statewide evaluation plan was needed for Tech-Prep. Through a competitive proposal process, consortia were invited to design evaluation models. The CTTPC was one of two consortia (the other being the TPCQ) commissioned to design prototype models.

The system is designed to create uniform and transferable program evaluation models for the 30 Tech-Prep consortia statewide. The CTTPC has worked with other consortium directors to modify and expand the CTTPC evaluation model for use by other consortia. All programs will uniformly collect the types of data required by the federal government. Consortia will also use the same software (MS Access) to create a student database. Prototype forms will be used to develop a generic model which provides full tracking of Tech-Prep students from entry point in high school through the postsecondary institution and to their chosen careers.

Strategies have been developed to interface with CUNY and SUNY offices of institutional research to follow students as they enter non-Tech-Prep postsecondary institutions within in the public university system. A manual is being developed to guide implementation at all Tech-Prep consortium sites, and the CTTPC has provided ongoing technical assistance during the development of this model. This model will be piloted during the 1999-2000 academic year.

GREATER CAPITAL DISTRICT TECH-PREP CONSORTIUM

Introduction

The Greater Capital District Tech-Prep Consortium (GCDTPC) is one of the seven Tech-Prep charter programs that was launched in New York State during the 1991-92 academic year. The State University of New York (SUNY) Research Foundation, on behalf of the Two-Year College Development Center (TYCDC), SUNY at Albany, serves as the fiscal agent for this consortium which, during the 1997-98 academic year, involved 34 school districts, four regional BOCES, six two-year postsecondary institutions and more than 150 business partners. The GCDTPC covers 13 counties, an area larger than Rhode Island and Connecticut *combined*. The consortium members include:

School Districts
Albany City, Alternative School (Broadalbin), Averill Park, Berne-Knox-Westerlo, Broadalbin-Perth, Cairo-Durham, Canajoharie, Catskill, Cohoes, Fonda-Fultonville, Fort Plain, Galway, Glens Falls, Gloversville, Granville, Hoosick Falls, Ichabod Crane, Lansingburgh, Mayfield, Middlesburgh, Mohonasen, Northville, Rensselaer, St. Johnsville, Schenectady, Schoharie, Schuylerville, Sharon Springs, South Colonie, South Glens Falls, Taconic Hills, Troy City, Watervliet, Wells.

BOCES
Capital Region, Hamilton-Fulton-Montgomery, Questar III, Washington-Saratoga-Warren-Hamilton-Essex.

Colleges
Adirondack Community College, Columbia-Greene Community College, Fulton-Montgomery Community College, Hudson Valley Community College, Schenectady County Community College, State University of New York College of Agriculture & Technology at Cobleskill

In addition, a large number of small, medium and large businesses are actively involved, including Bell Atlantic, Marriott, Glen Sanders Mansion, Key Bank, New York State Legislature, Howe Caverns, Albany International, Columbia-Greene Medical Center, WalMart and Cambridge Manufacturing.

The consortium reported that during the fall 1997 semester, 1,243 high school students were enrolled in at least one Tech-Prep course and 39 postsecondary students were enrolled in

an articulated Tech-Prep program. Articulated curricula had been developed for the following career cluster major areas: business/information systems, health services, engineering technologies, human and public services, natural and agricultural sciences and art/humanities.

The architects of GCDTPC have been faced with the challenge of maximizing the finite resources made available for Tech-Prep program implementation to ensure that all participants, spanning a wide geographical area and including multiple partners, can be effectively served. To meet this task, the GCDTPC has created three unique organizational features: 1) an organizational structure for the management of a very large consortium, 2) the development of a mini-grant process for consortium members and 3) the formation of partnerships.

Organizational Structure for the Management of a Very Large Consortium

In August 1991, a GCDTPC steering committee was formed to serve as the project's policy-making body with each member college and BOCES represented by one member and one vote. The committee, which is convened by Constance Spohn, the GCDTPC project coordinator and director of the TYCDC, meets approximately every six weeks. A formal articulation agreement, which outlines specific roles and responsibilities of committee members, is signed by the chief executive officer of each member institution on an annual basis. In addition, a leadership advisory committee, comprised of member college presidents, BOCES superintendents (or their representatives), local education agency superintendents and business partners is convened annually by Ms. Spohn. Each of the consortium agencies employs a local coordinator who serves as a field contact, assists the steering committee member and attends steering committee meetings.

The project staff at the TYCDC provides general oversight and support to member institutions and has also offered consortium-wide curriculum and staff development. They have promoted the use and adaptation of applied curricula developed by the Center for Occupational Research and Development (CORD), and have sent teachers to the CORD headquarters in Waco, Texas for training related to specific CORD math, science and principles of technology curricula. These teachers have in turn been asked to become trainers and transfer what they

have learned to colleagues in their consortia.

The size of the consortium, however, has made it difficult to provide intensive or ongoing support or substantial direct funding to specific member sites. For this reason, the steering committee decided early on to divide the consortium into regional entities. Today, the consortium is comprised of six sub-groups, each built around one member college and including one or more BOCES and multiple school districts. (The four BOCES are shared by several sub-groups.)

Sub-groups work independently as well as in concert with other sub-groups, when appropriate. Key members of regional sub-groups meet separately on a regular basis to structure curriculum and staff development activities, which include representation at statewide and national Tech-Prep meetings and conferences. To minimize costs, sub-groups collaborate on joint ventures, such as staff development workshops, to fulfill common needs.

Mini-Grants

The TYCDC has attempted to maximize the management of limited grant funds through the use of a targeted and competitive mini-grant process.

Each year, the New York State Education Department targets several specific priorities for the 30 Tech-Prep consortia in an effort to refine and expand Tech-Prep statewide. Priorities for 1998-99 were program expansion, new assessments, postsecondary staff development, creation of a data "flagging" system and development of seamless curriculum. The GCDTPC attempts to address these priorities by offering direct funding opportunities to sub-groups who express an interest in one or more of these priorities. The following is a brief description of several mini-grant programs that have been implemented by the GCDTPC:

Postsecondary Involvement Incentive Project

Tech-Prep curriculum and staff development efforts have progressed more quickly and comprehensively at the high school level, and have lagged at the postsecondary level both in

New York State and the rest of the nation. To address this gap, the GCDTPC targeted as a priority postsecondary involvement by "admissions and outreach staff, and faculty" for the 1997-98 and 1998-99 academic years. Incentive grants (at funding levels of $1,000 - $2,000 per college) were offered to each of the six two-year colleges.

During the 1997-98 year, such projects included: development of a ten-week, one- credit hour course offered to women registered in nontraditional postsecondary career programs; expansion of high school/college articulation agreements and publication of agreements on web pages for easy access by parents, students and counselors; integration of applied communications principles and applications into college level developmental writing courses; and workshops involving, among others, secondary and postsecondary faculties. Additional activities for fiscal year 1999 were proposed, ranging from curriculum and articulation development to faculty shadowing in the workplace and tracking student progress from high school to college.

Program Expansion in Tech-Prep Schools

The GCDTPC allocated $10,000 for fiscal year 1999 for the expansion of Tech-Prep in existing schools with funding earmarked for a minimum of ten schools, for up to $1,000 each. Expansion funds were offered through a mini-grant process for schools which agreed to one or more of the following initiatives: adding additional sections of applied academics within a school, increasing the number of students designated as Tech-Prep students and/or increasing the number of services offered to Tech-Prep students.

Career Information and Parents

The Career Information and Parents mini-grant project allocated a total of $32,000 for the 1999 fiscal year to fund sixteen teams from urban, rural, suburban and BOCES sub-group districts. Each team requires the participation of two faculty members, two parents and one administrator or counselor. The project goals are to: increase parent knowledge and participation in the career development process of their children, increase parent understanding and support of Tech-Prep and School-to-Work initiatives, promote awareness of nontraditional career paths and disseminate information about the materials and strategies developed.

Tech-Prep Gender Equity

The GCDTPC offered (from 1993-1996) mini-grants of up to $1,000 to participating school districts to develop programs designed to interest students in technical occupations that are nontraditional to their gender. The centerpiece of this program, first developed for middle school students of the Fonda-Fultonville School District, involved visits to potential Tech-Prep enrollees by role models working in nontraditional occupations. The program included a training session for potential role models, instructional activities for teachers, a wrap-up reflection session involving role models, teachers and administrators and an evaluation form for students, teachers and role models.

Formation of Partnerships

A positive outcome of the Tech-Prep experience in the Greater Capital District has been the climate of cooperation that has developed between local colleges, school districts, BOCES and members of the business community. Traditional impediments and pitfalls such as unfamiliarity, competition, loss of control, and other "turf" issues had been previously addressed and replaced with a greater level of trust, understanding of challenges faced, recognition of accomplishments and acknowledgement of complementary interests. This has led to a greater willingness to articulate a common vision, collaborate and pool resources. Given this climate, GCDTPC was in a position to develop enhanced program offerings despite limited funding through the linkage of Tech-Prep with other programs. Two such initiatives have emerged: GCDTPC's partnerships with neighboring school-to-work programs and Fulton-Montgomery Community College's efforts to link Tech-Prep with NASA's GLOBE Project.

School-to-Work

The GCDTPC is a member of the six School-to-Work partnerships in the area, and the project coordinator, Ms. Spohn, participates in partnership meetings. School-to-Work is a broad concept involving students at all grade levels in school-based, work-based and connecting activities. Tech-Prep is a natural fit within the School-to-Work paradigm by offering expertise in applied academics curriculum development and dissemination, staff development and postsecondary articulation agreement models.

Applied academics, integration of academic and vocational education and contextual learning conferences have been jointly planned by Tech-Prep and School-to-Work partnerships and conducted for middle, secondary and postsecondary school levels. For example, the Tech-Prep Middle School Career Development Cadre received matching funds and publicity from the School-to-Work partnerships to conduct training for over 500 teachers in the region.

The School-to-Work and Tech-Prep coordinators meet on a regular basis to address common needs and concerns that relate to the present and future of both programs. Joint decisions are made on the support of special initiatives between various partnerships and the GCDTPC. Often, this planning leads to a more systemic initiative, as in the case of the GLOBE Program.

The GLOBE (Global Learning and Observations to Benefit the Environment) Program

Richard Prestopnik, the Tech-Prep director at Fulton-Montgomery Community College, participated in a fellowship program at NASA's Stennis Space Center. He then nurtured the relationships he had developed at NASA. As a result, NASA became an active business partner at Fulton-Montgomery Community College; NASA donated Internet technology and sent scientists to train college and high school teachers to participate in the GLOBE Program.

GLOBE is a hands-on environmental science and education program that unites students and educators from over 4,000 schools in 58 countries to work with scientists to study the global environment. Student participants, under the direction of trained instructors, follow a quality control learning process which includes making core environmental observations at or near their schools, reporting their data to a GLOBE processing facility, using global images created from worldwide school data and studying environmental topics in their classrooms. (For additional information, see the GLOBE home page at: http://www.globe.gov.)

Ten local school districts have participated in the GLOBE Program which has served to enhance the credibility of Tech-Prep and School-to-Work partnerships. As a result, new businesses and community organizations have joined as consortium partners.

In the spring of 1998, with combined funding by NASA, GCDTPC and School-to-Work partnerships, a contingent of representatives from Tech-Prep and non-Tech-Prep schools visited a model middle school Tech-Prep program in Mississippi. This program serves as a preparatory program for the Tech-Prep high school component. As a result of this joint initiative, plans are underway to develop a similar program in the Greater Capital District.

MID-SUFFOLK TECH-PREP CONSORTIUM

Introduction

The Mid-Suffolk Tech-Prep Consortium (MSTPC), funded since the 1992-93 academic year, targets students attending school districts on eastern Long Island in the towns of Brookhaven, East Hampton, Islip, Riverhead, Shelter Island, Southampton and Southold. It is one of two Tech-Prep programs located in Suffolk County, a vast area of 911 square miles and approximately 1.5 million residents. The fiscal agent is the Eastern Suffolk BOCES. The consortium has grown over the years, and as of July 1998 included the following members of the region's education community:

School Districts
Brentwood, Three Village, West Islip, Patchogue-Medford, Bay Shore, Central Islip, Rocky Point, South Country, Sachem, Miller Place, Bridgehampton, Longwood, East Hampton, Southampton, Eastport, Riverhead, Sag Harbor, Islip, Shoreham-Wading River, West Hampton Beach, Shelter Island, Smithtown, Mt. Sinai, William Floyd

Two-Year Postsecondary Institutions
Suffolk County Community College, Briarclifff College, Long Island Business Institute, Suburban Technical Institute, Nassau Community College

Four-Year Postsecondary Institutions
Dowling College, Five Towns College, Long Island University at Southampton, New York Institute of Technology and the State University of New York College of Technology at Farmingdale.

The scope of the MSTPC has made it impossible to simply allocate significant funds directly to partner sites. Instead, the consortium has identified promising programs at local school districts which meet basic Tech-Prep requirements, address the new state standards, focus on targeted populations and articulate with comparable postsecondary curricula. These programs are offered resources for curriculum and staff development, limited equipment purchases and release time to attend conferences and workshops. In return, these program designers agree to serve as turnkey trainers and provide ongoing technical assistance to other member districts who wish to replicate their initiatives.

The MSTPC has also received active support from the area's business community including prominent corporations such as Brookhaven National Laboratory, Underwriters Laboratories, Long Island Savings Bank, Honeywell Corporation and Imperial Software. In addition, the Long Island Association, the largest chamber of commerce on Long Island and an umbrella group which oversees all chambers of commerce in Nassau and Suffolk counties, has emerged as a major consortium partner.

The MSTPC articulates as its mission the provision of "... a continuing educational program of applied and technical courses on the secondary and post-secondary level which prepares students to effectively work in a changing high tech society." A fully participating Tech-Prep student, therefore, is defined as one who has completed high school level applied academics (communications, math and science) and technical preparation courses and has then chosen to continue his/her education in a complementary career major at a participating postsecondary institution. However, course offerings vary by school district. Therefore, a student is identified as a Tech-Prep participant if s/he has taken one or more Tech-Prep courses and has a career area that matches a Tech-Prep career major. In July 1998, the consortium reported a total of 880 student participants; 510 at the secondary school level and 370 postsecondary participants.

Consortium school districts offer a variety of career majors in the areas of business/information systems, engineering technologies, natural and agricultural sciences and art and humanities, which are linked to articulated postsecondary programs. Articulation agreements have been drafted to create a process whereby students may qualify for four to seven advanced standing college credits at participating colleges in the following curriculum areas: oceanography/marine biology, technical electronics, business/office technology, hospitality and tourism and computer graphics. Traditionally, Tech-Prep students were required to pass a "challenge exam" in order to qualify for advanced standing. However, the MSTPC has reached a unique agreement with Suffolk County Community College stipulating that Tech-Prep students who complete approved courses with a grade of "B" or higher automatically qualify for advanced standing credit. Similar agreements are expected at both Nassau Community College and SUNY

College of Technology at Farmingdale.

The Suffolk, Long Island community has transformed itself from a defense industry dominated economy to a high tech center. The MSTPC program has in many ways positioned itself to further the region's transformation by serving as a conduit between the educational and business communities. This report will focus on three areas that have contributed to this synergy: BOCES as a Tech-Prep fiscal agent; collaboration with the Long Island Association; and curriculum development in high tech areas.

BOCES as a Tech-Prep Fiscal Agent

The Eastern Suffolk BOCES is one of 38 in New York State. BOCES institutions were first created in New York State in 1948 in response to the Intermediate School District Act, which allowed small school districts to pool resources for expensive programs and services, such as vocational and special education programs, and to house them in a centralized BOCES facility. School districts opt to purchase services from a BOCES when they determine that these services can be provided in a more efficient and cost-effective manner by the BOCES center. In turn, the BOCES is obligated to provide a service or program when two or more districts identify a specific need. Member districts share the costs of each particular program/service they decide to utilize. As a result, the more districts that participate, the lower the cost for everyone. The Eastern Suffolk BOCES currently provides services to 56 school districts in the region.

There are three Tech-Prep consortia located on Long Island. It is interesting to note that the fiscal agents for these programs are the Nassau BOCES, Western Suffolk BOCES and Eastern Suffolk BOCES. The MSTPC project director, John Volonts, believes a BOCES is in many ways ideally suited to manage a Tech-Prep program for two major reasons:

- BOCES centers have historically managed Vocational and Technical Education Act (VATEA) grants for small school districts throughout New York State, and Tech-Prep is funded as a separate line item in VATEA. Consequently, they were accustomed to administering these types of grants and were well positioned to successfully apply for this new funding source.

- BOCES have well established working relationships with school districts whereas postsecondary institutions that serve as Tech-Prep fiscal agents have often cited a host of "turf issues" as impediments to successful program implementation.

In addition, Mr. Volonts mentioned that the Eastern Suffolk BOCES currently administers six additional grants which target educational transitions to postsecondary and/or employment opportunities.

While the Eastern Suffolk BOCES experience with VATEA funding has proved to be a great advantage, it has also contributed to its greatest challenge. Vocational education has been viewed traditionally as a less rigorous, non-college bound track for high school students. In fact, one of the great challenges faced by Tech-Prep programs nationally has been to overcome the perception that Tech-Prep is little more than a re-packaging of vocational education. In addition, the college community has historically perceived applied academics as "watered down" courses. As a result, the MSTPC initially lacked credibility with school counselors, parents and students when it touted Tech-Prep as a "college prep parallel course of study." Successful collaboration with a major new partner, the Long Island Association, has helped the MSTPC address these challenges.

The Long Island Association

The MSTPC began on Long Island in an economic climate marked by a declining defense industry, corporate downsizing, high teacher salaries and high property taxes used to fund public education, all of which contributed to an adversarial relationship between the business and education communities

Three years ago, the Long Island Association hired a new executive director, Matthew Crosson, who believed that education should be viewed as an economic development asset. Instead of complaining about public education, he suggested that businesses should take a proactive stance and work with schools to better prepare students for the workplace. Mr. Crosson created a business/education committee that included representatives from industry, school districts, postsecondary institutions and area BOCES, and asked Mr. Volonts to serve as

the Tech-Prep representative. The committee identified four growth industries on Long Island that were expanding so quickly, it became difficult to recruit qualified employees. These industries are: computer software and the Internet, electronic technologies, graphic communications and advertising and biotechnology.

The committee developed strategies to make students, parents and members of the education community aware of career opportunities in these areas. Initially, members of the business community from the four targeted areas made classroom presentations. More recently, a video and an accompanying brochure were produced (co-sponsored by the Long Island Association, Cablevision, Briarcliff College and MSTPC), and distributed to every middle school and high school on Long Island in October 1998. The video, entitled "Project Long Island," encourages students to consider careers with Long Island companies in these growth areas.

The next step involves presenting students with the curriculum paths that will lead to exciting career opportunities with Long Island companies. Mr. Volonts' goal has been to get students to think of Tech-Prep as the means to that end.

Curriculum Development in High-Tech Areas

The MSTPC has enhanced its standing with the education and business communities by framing its curriculum development strategy around the four high-tech career areas identified by the Long Island Association. Curricula have been completed in the areas of computer technology and math/science/technology. Plans are underway to develop curricula in the other two growth areas, biotechnology and computer software, as well.

Computer Technology

The Computer Technology curriculum was developed by representatives from Imperial Software, Eastern Suffolk BOCES and three MSTPC school districts for the Patchogue-Medford Tech-Prep program. Combining innovative pedagogy and school-business collaboration, it targets three goals for students: to understand the fundamentals of microcomputers; to troubleshoot microcomputers and render them usable for Internet connection and for business applications and

to develop communications and interpersonal skills required to work effectively in a business environment.

Approximately 20 student participants are block scheduled during the first six weeks of this semester long course, allowing them to spend 2 1/2 hours per day learning in a "real world" setting at the Imperial Software corporate headquarters where technicians work directly with students and their teachers. The course curriculum has been adapted from industry developed materials used in Imperial's in-house training center. Students also receive intensive mentoring and hands-on training using state-of-the-art equipment. In addition, students and their teachers get to witness first hand how a high tech company operates. At the conclusion of the six-week period, students return to Patchogue-Medford High School, but their connection with the Imperial mentors doesn't end. Imperial received computers donated by Chase Manhattan Bank and upgraded them so that students could maintain contact with Imperial technicians/mentors via the Internet. Other computers, donated by Chase and the New York State Motor Vehicles Bureau, have been distributed to parents to utilize a program called *Homework* which helps parents keep track of their children's assignments and progress.

The Imperial Software CEO, Tom Murphy, decided that school/business partnerships offer a proactive strategy for preparing future entry-level employees. For example, before embarking on this project, his company had received 300 resumes and selected only three individuals who matched the requisite skills. Mr. Murphy views school-business collaboratives, such as that provided by Tech-Prep, as a cost-efficient solution to his manpower problems.

Math/Science/Technology

The integration of academic and vocational/technical disciplines is a primary goal of Tech-Prep. Teachers at the Bay Shore Union Free School District approached the challenge of teaching rigorous math, science and technology concepts to unmotivated and/or academically challenged students by creating a projects-based, integrated curriculum. The following challenging skills and concepts are targeted: cooperative learning, measurement, kinematics, vectors, dynamics, structures, static equilibrium and work, power and energy. The content,

however, is couched in hands-on activities that camouflage rigor with fun and include projects such as, "model plane contest," "egg shell adventure/crush test," "solar cell car race" and "sumo wrestler." The course is taught in a three period block by a team of math, science and technology instructors to approximately 50 students.

Mr. Volonts recently articulated how well this program has been received by student participants and noted that students often expressed difficulty identifying the math, science and technology instructors by their traditional disciplines. Participating teachers, in collaboration with MSTPC administrators, recently applied for and received an $85,000 grant from the National Science Foundation to purchase equipment to upgrade and expand this curriculum.

TECH-PREP CONSORTIUM OF QUEENS

Introduction

In 1992, the Tech-Prep Consortium of Queens (TPCQ) was established as a formal partnership between Queensborough Community College (QCC) of the City University of New York (serving as the fiscal agent), the New York City Board of Education, neighboring public high schools and local businesses. The TPCQ has expanded over the years and included the following six high schools as of September 1998: Beach Channel, Business Magnet, Hillcrest, Martin Van Buren, Newtown and Thomas Edison Vocational & Technical. The consortium also includes five local businesses which provide part-time and summer jobs for students: New York Public Library, Patient Care, American Cancer Society, Astoria Federal Savings Bank and Home Depot.

The partnership has created articulated four-year (grades 11 through 14) seamless curriculums in three career cluster majors (business/information systems, health services and engineering technologies) that students focus on throughout high school, the completion of two-year college degrees, and toward either entry-level positions, four-year college courses of study or both. In particular, high school students at Beach Channel, Business Magnet, Martin Van Buren and Newtown follow a Business Computer Information Systems Technology curriculum, Hillcrest students focus on a Health Science Technology curriculum and those from Thomas Edison High School pursue an Electrical and Computer Engineering Technology program of study.

In September 1998, the consortium reported a total enrollment of 781 students: Beach Channel-57, Business Magnet-32, Martin Van Buren-114, Newtown-120, Thomas Edison-30 and 68 continuing participants at QCC. In addition, expansion efforts for the 1998-99 academic year included the implementation of a new program with 60 students from Hillcrest High School and a strategy to offer preparatory services for 300 9th and 10th grade students at Beach Channel.

This section describes three unique features of the TPCQ program: a transition to college sequence of activities and services, staff development and instructional materials development.

Transition to College: Activities and Services

Pre-Freshman Testing and Remedation Program

The City University of New York requires all incoming students to sit for entrance exams in reading, writing and math. Students who fail one or more of the exams must enroll in non-credit-bearing developmental courses in these skills areas. Students are then re-tested and must eventually pass all three exams or face expulsion.

The TPCQ program administers alternate forms of the City University entrance exams in reading and writing to 11th grade Tech-Prep students to assess their language arts skills. These "practice" exams are administered by Tech-Prep project office staff members and assessed by QCC personnel. (Project administrators expect to offer the actual exams for test credit beginning in the fall 1999 semester.) Results are given to students, counselors, site coordinators, teachers, parents and tutors. Students are informed of language arts deficiencies and counselors offer opportunities for tutoring. Practice exams are administered again in the 12th grade in final preparation for the actual exams. Tech-Prep students who fail one or more of the actual exams are also given the opportunity to enroll in the college's pre-freshman summer program.

A new feature, provided by the City University's College Now program for 1998-99, offered Tech-Prep students the opportunity to enroll in the college level, non-credit-bearing developmental courses mentioned above while still in high school. The results of the practice college placement exams were used to identify students for enrollment in these courses which are offered at high school campuses and at QCC.

Traditionally, only 15% of QCC's entering freshman pass all three entrance exams and are, thereby, exempt from taking developmental courses. Program data collected by TPCQ administrators indicate that 33% of their Tech-Prep student participants who continue at QCC pass all three exams and, thereby, bypass the need to take developmental courses. As of September 1998, 538 students had taken 1,598 practice exams.

Earning College Credits While In High School

As part of the College Now program, Tech-Prep students are offered the opportunity to earn six college credits before earning their high school diplomas. The program offers each student a three-credit course during the second half of the 11th grade and an additional three-credit course during the first half of the 12th grade. Students may choose from a variety of course offerings, including: Introduction to Microcomputer Applications, Database Management Systems, Organization and Delivery of Health Care and Introduction to Computer Programming. A total of 679 students have earned 4,153 college credits since the inception of the TPCQ program.

Staff Development:

Staff development has, from the outset, been an integral component of Tech- Prep programs. Tech-Prep programs have promoted a variety of non-traditional pedagogical approaches including: integration of academic and vocational education; applied and projects-based learning, career awareness and work-based learning, cooperative learning and alternative assessments. More recently, the focus has sharpened to explicitly address the new standards and assessments.

New York State has joined the national movement to upgrade learning standards for all students. Standards have been drafted in various disciplines, and the assessment process is being revamped to align with these new standards. As a result, at the high school level, plans are underway to phase out the Regents Competency Tests (RCTs). Traditionally, college preparatory candidates qualified for high school diplomas by taking a series of Regents exams in all major disciplines. The majority of students, however, were offered the option of taking less rigorous RCTs in order to meet graduation requirements. As a result, a two-track system was created. The new standards project is designed to create a single track for all students in which all students will be required to pass a battery of redesigned and more rigorous Regents exams to qualify for a high school diploma. The first of these new exams, the English Language Arts Regents will be offered to 11th graders in June 1999. The New York State Education Department has, therefore, asked all school reform initiatives, including Tech-Prep,

to work with teachers and students to "build capacity" to meet these new standards.

In particular, the TPCQ has implemented a unique strategy to meet this challenge. The consortium's project director, Victor P. Maiorana, has developed an approach entitled "Cognitive-Analytic Strategies and Techniques" (CASAT) and has used this original learning process as a centerpiece for staff development efforts with participating teachers. According to Dr. Maiorana, "CASAT provides a way for all teachers to help all students address raised learning standards in a natural, seamless, and learner-centered manner."

Staff development is presented in a four-phase process:

- Fundamentals of addressing and achieving national, state and local performance standards are explored, and teachers are introduced to CASAT through professional development workshops of one to three days duration.
- Workshops are provided for faculty to write standards-based instructional sets.
- Teachers introduce CASAT to their students through use of *The Analytic High School Student* (Rosebooke Publishing, 1998). During this phase, the standards-based cognitive-analytic instructional sets are delivered in the classroom.
- Teachers assess the effectiveness of the instructional set, draft a written assessment report and plan revisions.

A more thorough explanation of the CASAT process is offered below.

Instructional Materials Development

A CASAT instructional set is designed to provide teachers with examples of critically framed classroom assignments that directly address a variety of teaching and learning standards. Each CASAT instructional set targets a particular subject course and topic and includes checklists of itemized federal (SCANS and Goals 2000), New York State and New York City learning standards. The checklists indicate the specific standards that are addressed by the particular classroom assignments offered in each instructional set.

Each set typically offers several examples of three types of classroom assignments. A "Constructing Understanding" assignment requires students to engage in some form of critical reasoning, writing, reading, listening and speaking on the subject matter topic. The

"Application of Understanding" assignment requires students to engage in workplace-based problem-solving. The "Career Opportunities" assignment asks students to explore career opportunities and descriptions associated with the subject matter topic. References are included to offer a cognitive rationale for the set as well as sources for related materials. A formal process of assessment is followed and instructional sets are periodically revised. According to Dr. Maiorana, English Language Arts standards are emphasized in all instructional sets because "... they apply to all faculties and represent learn-to-learn skills." A detailed description of one such instructional set is provided below.

A CASAT instructional set, entitled "Key Ideas In Economics," was developed for a grade 12 economics course. It offers a "standards check-off list" for the following standards:

- New York State English Language Arts Standards and Performance Indicators
- New York State Career Development and Occupational Studies (CDOS) standards and Performance Indicators
- New York State Social Studies Standard 4 - Economics
- Federal Applied Learning Standards: SCANS Foundations Skills, SCANS Competencies and Goals 2000
- New York City English Language Arts Standards

The standards are reprinted verbatim, and a column labeled "Assign #" indicates the specific standards and performance indicators addressed by each assignment in the instructional set. For example, assignment 2 addresses the New York State English Language Arts listening and reading standard which requires that students "use a wide variety of strategies to select, organize, categorize subject matter," and assignment 5 applies the New York State Social Studies Standard which asks that students, "understand the nature of scarcity and how nations of the world make choices which involve economic and social costs and benefits."

The check-off lists are followed by a rationale for determining if a learning activity addresses a particular performance standard. This rationale attempts to insure that students and teachers have a shared understanding of how competencies are assessed.

The instructional set includes three parts. The first, *Constructing Understanding*, contains four sequential assignments. Assignment 1 introduces the following basic economic terms: "economic system, standard of living, land, labor, capital, management, goods and services." Students are asked to work in groups of three to review the terms for understanding. The second part of this assignment lists nine "key ideas in economics," such as "a good is manufactured or a service is developed," and "individuals and society which produce less and will have a lower standard of living." Students are asked to analyze the items and label them as either a purpose, resource, activity, positive consequence or negative consequence. Assignment 2, entitled "A Critically Constructed View of Key Ideas in Economics," includes four questions in an outline form. Blank and filled in bullets are listed under each question. Students are asked to place the elements they identified in "Assignment 1a" (basic economic terms) on the appropriate blank lines. Assignment 3 identifies use of the writing process as one of the New York State English language arts standards. Students are asked to use the outline developed in the previous assignment to develop a draft (step two of the writing process) entitled, "A Narrative on the Key Ideas in Economics." Assignment 4 asks students to revise their handwritten essays (step 3) on a word processor.

Part 2 of this instructional set, entitled *Applying What You Understand*, contains one assignment. This section addresses the concept of supply and demand and describes the disparity between "human wants and scarce resources" as a universal economic problem. A student, when asked to summarize this problem, drew a large square (labeled "Human Wants") and a small square ("Scarce Resources") on the chalkboard, and this illustration is reproduced in the instructional set. Students are asked to write a one-paragraph explanation of this illustration.

The final section, *Career Exploration*, begins with an excerpt from the *Occupational Outlook Handbook* which describes the job responsibilities of an economist. Students are then given a two-part group assignment. First, they are asked to develop an outline, using the format modeled in assignment 2, which summarizes the reading excerpt. Then, as a culminating activity, students are asked to consider who would make a better economist -- a man or a woman.

As of October 1998, approximately 100 instructional sets had been developed and 22 had been approved for distribution and use. These sets focus on a variety of subjects and disciplines including the natural and social sciences, the humanities, the technologies and career areas.

APPENDIX

For more information about the **City Tech Tech-Prep Consortium**, contact:

Anne Gawkins, Project Director
City Tech Tech-Prep Consortium
New York City Technical College
Office of High School Programs, N105
300 Jay Street
Brooklyn, NY 11201

Phone: 718-260-5207
Fax: 718-260-5503
e-mail: agany@cunyvm.cuny.edu

For more information about the **Greater Capital District Tech-Prep Consortium,** contact:

Constance H. Spohn, Coordinator
Greater Capital District Tech-Prep Consortium
Two-Year College Development Center
University at Albany
208 Husted
135 Western Avenue
Albany, NY 12222

Phone: 518-442-5590
Fax: 518-442-9055
e-mail: CS785@cnsibm.albany.edu

For more information about the **Mid-Suffolk Tech-Prep Consortium**, contact:

John Volonts, Director
Mid-Suffolk Tech-Prep Consortium
Eastern Suffolk BOCES
350 Martha Avenue
Bellport, NY 11713

Phone: 516-286-6580
Fax: 516-286-6588
e-mail: jvolonts@sricboces.org

For more information about the **Tech-Prep Consortium of Queens**, contact:

Dr. Victor P. Maiorana, Project Director
Tech-Prep Consortium of Queens
Queensborough Community College
222-05 56th Ave., Room H-456
Bayside, NY 11364

Phone: (718) 631-6315
Fax: (718) 631-6076
e-mail: vpmayo@mindspring.com

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